SOLUCIÓN PRUEBA DE HABILIDADES PRACTICAS CCNA

PRESENTADO
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DIPLOMADO DE PROFUNDIZACIÓN CISCO

UNIVERSIDAD NACIONAL ABIERTA Y A DISTANCIA UNAD
PROGRAMA DE INGENIERIA EN SISTEMA OPCION DE GRADO.
CEAD – PALMIRA (2019)

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PÁGINA DE ACEPTACIÓN

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PRESIDENTE

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JURADO

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JURADO

Buenaventura, Valle del Cauca 19 de julio de 2019

DEDICATORIA

Quiero dedicar este logro inicialmente al **DIOS DE LA VIDA Y EL AMOR,** por siempre a ver estado ahí, por darme esa fortaleza que necesitaba para poder cumplir con este objetivo, que me perdone por las tantas veces que quise tirar la toalla y no seguir con este proyecto tan vital para mi vida y toda mi familia. Gracias **DIOS PADRE, DIOS HIJO Y DIOS ESPIRITU SANTO**, por darme esta oportunidad.

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Que hubiera sido mi vida sin ustedes dos hermanos de mi alma, gracias por el apoyo y acompañamiento que siempre me brindaron, espero que estén orgullosos de mí, perdonen mis afanes, mis tristezas, mis incomodidades, **DIOS ME LOS BENDIGA,** por todo el esfuerzo que hicieron en apoyarme.

A MI AMIGA

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TABLA DE CONTENIDO

INTRODUCCION

Cada día es de gran importancia estar comunicados, conectados, relacionándonos, utilizando medios que nos permitan que la información o datos se desplacen continuamente de un lugar a otro de forma instantánea, sea en cuestión de segundos o menos que un segundo. Debido a lo cual una de las maneras de comunicación entre un número determinado de computadoras es por medio de la conexión de equipos a una red LAN, la cual nos facilitará, mediante el cableado y un dispositivo, distribuyendo la información a diferentes puntos o equipos que se encuentren repartidos en un sitio determinado.

Una forma de poder estudiar los tipos de redes es primeramente investigarlas, analizarlas, describir las funciones y características de cada componente. Inicialmente nos enfocamos en el estudio de la red LAN, que se la denomina así porque es una red que se la ocupa en un determinado espacio y mediante la utilización de emuladores en este caso el emulador “CISCO PACKET TRACER”, el cual permitirá realizar una configuración básica de computadores, con su respectiva simulación y comprobación de haber realizado una conexión exitosa.

OBJETIVOS GENERALES

Con este trabajo el tutor busca que apliquemos implemente todos los conocimientos de conectividad, configuración de los switch y lista de control de acceso entre otros.

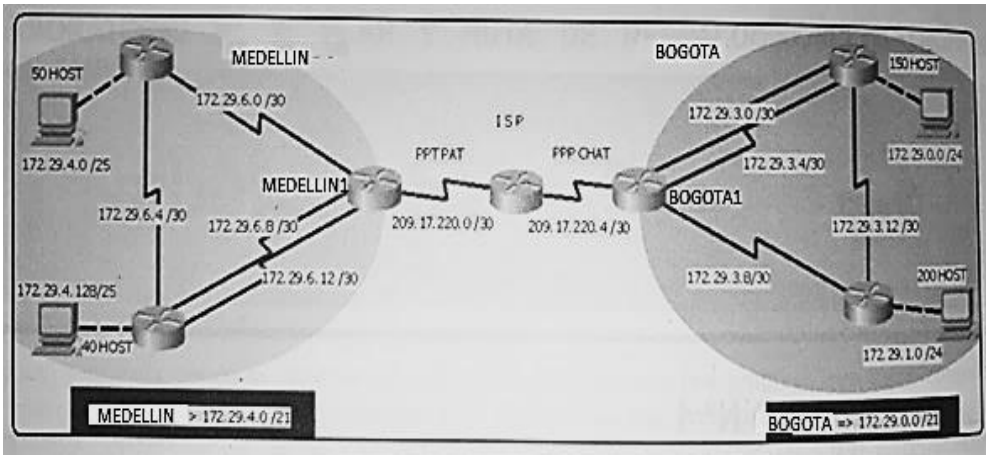
OBJETIVOS GENERALES

- ✓ Realizar el direccionamiento IP de cada uno de los equipos que conforman la red.
- ✓ Cumplir a cabalidad con la topología propuesta en la guía para el desarrollo de la actividad.
- ✓ Configurar el protocolo de enrutamiento OSPF
- ✓ Aplicar todos los conocimientos adquiridos en la configuración del escenario 1.
- ✓ Aplicar todos los conocimientos adquiridos en la configuración del escenario 2

Escenario 1

Una empresa posee sucursales distribuidas en las ciudades de Bogotá y Medellín, en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los lineamientos establecidos para el direccionamiento IP, protocolos de enrutamiento y demás aspectos que forman parte de la topología de red.

Topología de red



DESARROLLO DE LOS ESCENARIOS
PUNTO UNO

NOMBRES DE LOS EQUIPOS

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Medellin2
Medellin2(config)#line console 0
Medellin2(config-line)#password marien
Medellin2(config-line)#login
Medellin2(config-line)#exit
Medellin2(config)#enable password marien
```

Configuración interface

```
User Access Verification

Password:

Medellin2>enable
Password:
Medellin2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Medellin2(config)#interface fastEthernet 0/0
Medellin2(config-if)#ip address 172.29.4.1 255.255.255.128
Medellin2(config-if)#no shutdown
Medellin2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up

Medellin2(config)#interface serial 0/0/0
Medellin2(config-if)#ip address 172.29.6.1 255.255.255.252
Medellin2(config-if)#no shutdown
Medellin2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Medellin2(config-if)#


Medellin2(config-if)#interface serial 0/0/1
Medellin2(config-if)#ip address 172.29.6.5 255.255.255.252
Medellin2(config-if)#no shutdown
```

```
Medellin2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

Medellin2(config-if)#

Medellin2#enable
Medellin2#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
Medellin2#


Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Medellin3
Medellin3(config)#line console 0
Medellin3(config-line)#password marien
Medellin3(config-line)#login
Medellin3(config-line)#exit
Medellin3(config)#enable secret marien
Medellin3(config)#interface fastethernet 0/0
Medellin3(config-if)#ip address 172.29.4.129 255.255.255.128
Medellin3(config-if)#no shutdown

Medellin3(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up
Medellin3(config-if)#

Medellin3(config-if)#interface serial 0/0/1
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1
Medellin3(config-if)#interface serial 0/0/0
Medellin3(config-if)#ip address 172.29.6.9 255.255.255.252
Medellin3(config-if)#no shutdown
Medellin3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up


Medellin3(config-if)#interface serial 0/1/1
```

```
Medellin3(config-if)#ip address 172.29.6.13 255.255.255.252
Medellin3(config-if)#no shutdown

Medellin3(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up

Medellin3(config-if)#exit
Medellin3#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]


Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Medellin1
Medellin1(config)#line console 0
Medellin1(config-line)#password marien
Medellin1(config-line)#login
Medellin1(config-line)#exit
Medellin1(config)#enable password marien
Medellin1(config)#exit
Medellin1#
%SYS-5-CONFIG_I: Configured from console by console

Medellin1(config)#interface serial 0/0/1
Medellin1(config-if)#ip address 172.29.6.1 255.255.255.252
Medellin1(config-if)#no shutdown

Medellin1(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

Medellin1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/1, changed state
to up

Medellin1(config-if)#

Medellin1(config-if)#interface serial 0/0/0
Medellin1(config-if)#ip address 209.17.220.1 255.255.255.252
Medellin1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
Medellin1(config-if)#
```

```
Medellin1(config-if)#interface serial 0/0/1
Medellin1(config-if)#ip address 172.29.6.2 255.255.255.252
Medellin1(config-if)#no shutdown
Medellin1(config-if)#interface serial 0/1/0
Medellin1(config-if)#ip address 172.29.6.10 255.255.255.252
Medellin1(config-if)#no shutdown

Medellin1(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state
to up

Medellin1(config-if)#
Medellin1(config-if)#interface serial 0/1/1
Medellin1(config-if)#ip address 172.29.6.14 255.255.255.252
Medellin1(config-if)#no shutdown

Medellin1(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up
Medellin1(config-if)#
Medellin1(config-if)#exit
Medellin1(config)#exit
Medellin1#
%SYS-5-CONFIG_I: Configured from console by console

Medellin1#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
Medellin1#


Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname ISP
ISP(config)#enable password marien
ISP(config)#enable secret marien
The enable secret you have chosen is the same as your enable password.
This is not recommended. Re-enter the enable secret.
ISP(config)#line console 0
ISP(config-line)#password cisco
ISP(config-line)#login
```

```
ISP(config-line)#exit
ISP(config)#interface serial 0/0/1
ISP(config-if)#ip address 209.17.220.5 255.255.255.252
ISP(config-if)#no shutdown
ISP(config-if)#interface serial 0/0/0
ISP(config-if)#ip address 209.17.220.1 255.255.255.252
ISP(config-if)#no shutdown

ISP(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

ISP(config-if)#

ISP#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
ISP#

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Bogota1
Bogota1(config)#line console 0
Bogota1(config-line)#password marien
Bogota1(config-line)#login
Bogota1(config-line)#enable password marien
Bogota1(config)#interface serial 0/1/1
Bogota1(config-if)#ip address 172.29.3.5 255.255.255.252
Bogota1(config-if)#no shutdown

Bogota1(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up

Bogota1(config-if)#

Bogota1(config-if)#interface serial 0/0/1
Bogota1(config-if)#ip address 172.29.3.1 255.255.255.252
Bogota1(config-if)#no shutdown

Bogota1(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

Bogota1(config-if)#
Bogota1(config-if)#interface serial 0/0/0
```

```
Bogota1(config-if)#ip address 209.17.220.6 255.255.255.252
Bogota1(config-if)#no shutdown

Bogota1(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

Bogota1(config-if)#
Bogota1(config-if)#interface serial 0/1/0
Bogota1(config-if)#ip address 172.29.3.9 255.255.255.252
Bogota1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
Bogota1(config-if)#

Bogota1(config-if)#exit
Bogota1(config)#exit
Bogota1#
%SYS-5-CONFIG_I: Configured from console by console

Bogota1#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
Bogota1#

outer>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Bogota2
Bogota2(config)#line console 0
Bogota2(config-line)#password marien
Bogota2(config-line)#login
Bogota2(config-line)#enable password marien
Bogota2(config)#interface fastEthernet 0/0
Bogota2(config-if)#ip address 172.29.0.1 255.255.255.0
Bogota2(config-if)#no shutdown

Bogota2(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up

Bogota2(config-if)#
```

```
Bogota2(config-if)#interface serial 0/1/0
Bogota2(config-if)#ip address 172.29.3.13 255.2555.255.252
^
% Invalid input detected at '^' marker.
Bogota2(config-if)#ip address 172.29.3.13 255.255.255.252
Bogota2(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down
Bogota2(config-if)#

Bogota2(config-if)#interface serial 0/0/0
Bogota2(config-if)#ip address 172.29.3.2 255.255.255.252
Bogota2(config-if)#no shutdown

Bogota2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

Bogota2(config-if)#

Bogota2(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up

Bogota2(config-if)#interface serial 0/0/1
Bogota2(config-if)#ip address 172.29.3.6 255.255.255.252
Bogota2(config-if)#no shutdown

Bogota2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

Bogota2(config-if)#

Bogota2(config-if)#exit
Bogota2(config)#exit
Bogota2#
%SYS-5-CONFIG_I: Configured from console by console

Bogota2#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
Bogota2#

Router>enable
```

```
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Bogota3
Bogota3(config)#line console 0
Bogota3(config-line)#password marien
Bogota3(config-line)#login
Bogota3(config-line)#enable password marien
Bogota3(config)#interface fast
Bogota3(config)#interface fastEthernet 0/0
Bogota3(config-if)#ip address 172.29.1.2 255.255.255.0
Bogota3(config-if)#no shutdown

Bogota3(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up

Bogota3(config-if)#

Bogota3(config-if)#interface serial 0/0/1
Bogota3(config-if)#ip address 172.29.3.14 255.255.255.252
Bogota3(config-if)#no shutdown

Bogota3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/1, changed state to up

Bogota3(config-if)#
Bogota3(config-if)#interface serial 0/0/0
Bogota3(config-if)#ip address 172.29.3.10 255.255.255.252
Bogota3(config-if)#no shutdown

Bogota3(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
Bogota3(config-if)#

Bogota3(config-if)#exit
Bogota3(config)#exit
Bogota3#
%SYS-5-CONFIG_I: Configured from console by console
Bogota3#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
Bogota3#
```

PARTE 1: CONFIGURACIÓN DEL ENRUTAMIENTO

a. Configurar el enrutamiento en la red usando el protocolo RIP versión 2, declare la red principal, desactive la sumarización automática.

Luego de haber realizado la configuración básica del router se pasa a realizar la configuración del enrutamiento con el protocolo rip versión 2.

```
Medellin1(config)#router rip
Medellin1(config-router)#version 2
Medellin1(config-router)#network 172.29.6.0
Medellin1(config-router)#network 172.29.6.8
Medellin1(config-router)#network 172.29.6.12
Medellin1(config-router)#network 209.17.220.0
Medellin1(config-router)#passive-interface serial 0/0/0
Medellin1(config-router)#no auto-summary
Medellin1(config-router)#exit

Medellin2(config)#router rip
Medellin2(config-router)#network 172.29.4.0
Medellin2(config-router)#network 172.29.6.0
Medellin2(config-router)#network 172.29.6.4
Medellin2(config-router)#passive-interface fastEthernet 0/0
Medellin2(config-router)#no auto-summary
Medellin2(config-router)#exit
Medellin3(config)#router rip
Medellin3(config-router)#network 172.29.4.128
Medellin3(config-router)#network 172.29.6.4
Medellin3(config-router)#network 172.29.6.8
Medellin3(config-router)#network 172.29.6.12
Medellin3(config-router)#passive-interface fastEthernet 0/0
Medellin3(config-router)#no auto-summary
Medellin3(config-router)#exit

Bogota1(config)#router rip
Bogota1(config-router)#version 2
Bogota1(config-router)#network 172.29.3.0
Bogota1(config-router)#network 172.29.3.4
Bogota1(config-router)#network 172.29.3.8
Bogota1(config-router)#network 209.17.220.4
Bogota1(config-router)#passive-interface serial 0/0/0
Bogota1(config-router)#no auto-summary
Bogota1(config-router)#exit
Bogota2(config)#router rip
Bogota2(config-router)#version 2
Bogota2(config-router)#network 172.29.1.0
```

```
Bogota2(config-router)#network 172.29.3.8
Bogota2(config-router)#network 172.29.3.12
Bogota2(config-router)#passive-interface fastEthernet 0/0
Bogota2(config-router)#no auto-summary
Bogota2(config-router)#exit
Bogota3(config)#router rip
Bogota3(config-router)#version 2
Bogota3(config-router)#network 172.29.0.0
Bogota3(config-router)#network 172.29.3.0
Bogota3(config-router)#network 172.29.3.4
Bogota3(config-router)#network 172.29.3.12
Bogota3(config-router)#passive-interface fastEthernet 0/0
Bogota2(config-router)#no auto-summary
Bogota2(config-router)#exit
Bogota2(config)#
```

b. Los routers Bogota1 y Medellín deberán añadir a su configuración de enrutamiento una ruta por defecto hacia el ISP y, a su vez, redistribuirla dentro de las publicaciones de RIP.

```
Bogota1>enable
Password:
Bogota1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Bogota1(config)#ip route 0.0.0.0 0.0.0.0 serial 0/0/0
Bogota1(config-router)#redistribute static
Bogota1(config)#router rip
Bogota1(config-router)#default-information originate
Bogota1(config-router)#do wr
Building configuration...
[OK]
Medellin1>enable
Password:
Medellin1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Medellin1(config)#ip route 0.0.0.0 0.0.0.0 serial 0/0/0
Medellin1(config)#router rip
Medellin1(config-router)# redistribute static
Medellin1(config-router)#default-information originate
Medellin1(config-router)#do wr
Building configuration...
[OK]
Medellin1(config-router)#exit
```

c. El router ISP deberá tener una ruta estática dirigida hacia cada red interna de Bogotá y Medellín para el caso se sumarizan las subredes de cada uno a /22.

```
ISP>enable
ISP#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ISP(config)#ip route 172.29.0.0 255.255.0.0 serial 0/0/1
ISP(config)#do wr
Building configuration...
[OK]
ISP(config)#exit
    ISP#

ISP#show ip route

Gateway of last resort is not set

S   172.29.0.0/16 is directly connected, Serial0/0/0
is directly connected, Serial0/0/1
209.17.220.0/30 is subnetted, 2 subnets
C 209.17.220.0 is directly connected, Serial0/0/1
C 209.17.220.5 is directly connected, Serial0/0/0
```

Parte 2: Tabla de Enrutamiento.

a. **Verificar la tabla de enrutamiento en cada uno de los routers para comprobar las redes y sus rutas**.

ROUTER MEDELLÍN1

Medellin1>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
R 172.29.4.0/25 [120/1] via 172.29.6.1, 00:00:07, Serial0/0/1
R 172.29.4.128/25 [120/1] via 172.29.6.9, 00:00:21, Serial0/1/0
[120/1] via 172.29.6.13, 00:00:21, Serial0/1/1
C 172.29.6.0/30 is directly connected, Serial0/0/1
R 172.29.6.4/30 [120/1] via 172.29.6.9, 00:00:21, Serial0/1/0
[120/1] via 172.29.6.1, 00:00:07, Serial0/0/1
[120/1] via 172.29.6.13, 00:00:21, Serial0/1/1
C 172.29.6.8/30 is directly connected, Serial0/1/0
C 172.29.6.12/30 is directly connected, Serial0/1/1

ROUTER MEDELLIN2

Medellin2>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 172.29.6.2 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
C 172.29.4.0/25 is directly connected, FastEthernet0/0

S 172.29.4.128/25 [1/0] via 172.29.6.4
C 172.29.6.0/30 is directly connected, Serial0/0/0
C 172.29.6.4/30 is directly connected, Serial0/0/1
R 172.29.6.8/30 [120/1] via 172.29.6.2, 00:00:10, Serial0/0/0
[120/1] via 172.29.6.6, 00:00:18, Serial0/0/1
R 172.29.6.12/30 [120/1] via 172.29.6.2, 00:00:10, Serial0/0/0
[120/1] via 172.29.6.6, 00:00:18, Serial0/0/1
R* 0.0.0.0/0 [120/1] via 172.29.6.2, 00:00:10, Serial0/0/0

ROUTER MEDELLIN3

Medellin3>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 172.29.6.10 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
S 172.29.4.0/25 [1/0] via 172.29.6.4
C 172.29.4.128/25 is directly connected, FastEthernet0/0
R 172.29.6.0/30 [120/1] via 172.29.6.10, 00:00:04, Serial0/0/0
[120/1] via 172.29.6.5, 00:00:08, Serial0/0/1
[120/1] via 172.29.6.14, 00:00:04, Serial0/1/1
C 172.29.6.4/30 is directly connected, Serial0/0/1
C 172.29.6.8/30 is directly connected, Serial0/0/0
C 172.29.6.12/30 is directly connected, Serial0/1/1
R* 0.0.0.0/0 [120/1] via 172.29.6.10, 00:00:04, Serial0/0/0
[120/1] via 172.29.6.14, 00:00:04, Serial0/1/1
Medellin3>

ROUTER BOGOTA1

Bogota1>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
R 172.29.0.0/24 [120/1] via 172.29.3.2, 00:00:10, Serial0/0/1
[120/1] via 172.29.3.6, 00:00:10, Serial0/1/1
R 172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:13, Serial0/1/0
C 172.29.3.0/30 is directly connected, Serial0/0/1
C 172.29.3.4/30 is directly connected, Serial0/1/1
C 172.29.3.8/30 is directly connected, Serial0/1/0
R 172.29.3.12/30 [120/1] via 172.29.3.10, 00:00:13, Serial0/1/0
209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks
C 209.17.220.4/30 is directly connected, Serial0/0/0
C 209.17.220.6/32 is directly connected, Serial0/0/0
S* 0.0.0.0/0 is directly connected, Serial0/0/0
[1/0] via 209.17.220.6

ROUTER BOGOTA2

Bogota1>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
R 172.29.0.0/24 [120/1] via 172.29.3.2, 00:00:10, Serial0/0/1
[120/1] via 172.29.3.6, 00:00:10, Serial0/1/1
R 172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:13, Serial0/1/0
C 172.29.3.0/30 is directly connected, Serial0/0/1
C 172.29.3.4/30 is directly connected, Serial0/1/1
C 172.29.3.8/30 is directly connected, Serial0/1/0
R 172.29.3.12/30 [120/1] via 172.29.3.10, 00:00:13, Serial0/1/0
209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks
C 209.17.220.4/30 is directly connected, Serial0/0/0
C 209.17.220.6/32 is directly connected, Serial0/0/0
S* 0.0.0.0/0 is directly connected, Serial0/0/0
[1/0] via 209.17.220.6

ROUTER BOGOTA3

Bogota3>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 172.29.3.1 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
C 172.29.0.0/24 is directly connected, FastEthernet0/0
S 172.29.1.0/24 [1/0] via 172.29.3.12
C 172.29.3.0/30 is directly connected, Serial0/0/0
C 172.29.3.4/30 is directly connected, Serial0/0/1
R 172.29.3.8/30 [120/1] via 172.29.3.1, 00:00:26, Serial0/0/0
[120/1] via 172.29.3.5, 00:00:26, Serial0/0/1
R 172.29.3.12/30 [120/2] via 172.29.3.1, 00:00:26, Serial0/0/0
[120/2] via 172.29.3.5, 00:00:26, Serial0/0/1
209.17.220.0/30 is subnetted, 1 subnets
R 209.17.220.4 [120/1] via 172.29.3.1, 00:00:26, Serial0/0/0
[120/1] via 172.29.3.5, 00:00:26, Serial0/0/1

b. Obsérvese en los routers Bogotá1 y Medellín1 cierta similitud por su ubicación, por tener dos enlaces de conexión hacia otro router y por la ruta por defecto que manejan.

Bogota3>show ip route

Gateway of last resort is 172.29.3.9 to network 0.0.0.0

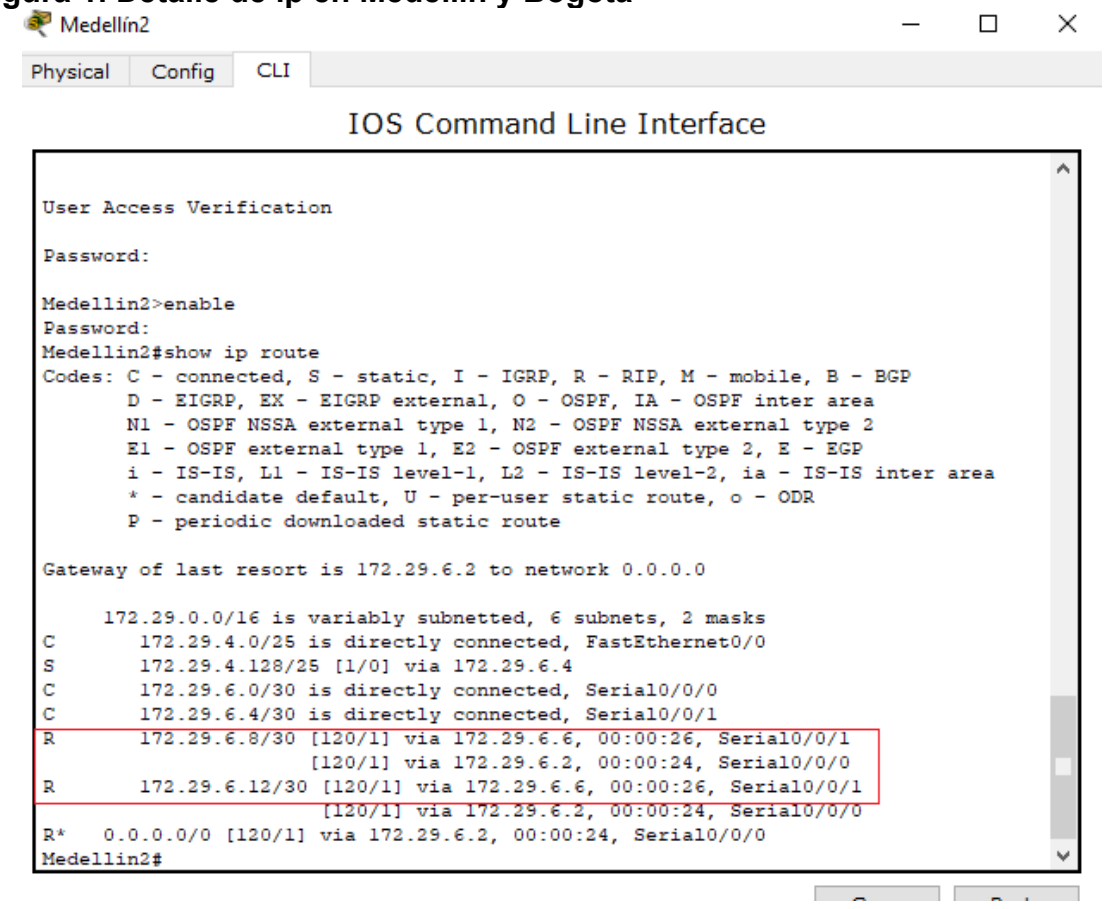
172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
R 172.29.0.0/24 [120/2] via 172.29.3.9, 00:00:15, Serial0/0/0
C 172.29.1.0/24 is directly connected, FastEthernet0/0
R 172.29.3.0/30 [120/1] vía 172.29.3.9, 00:00:15, Serial0/0/0
R 172.29.3.4/30 [120/1] vía 172.29.3.9, 00:00:15, Serial0/0/0
C 172.29.3.8/30 is directly connected, Serial0/0/0
C 172.29.3.12/30 is directly connected, Serial0/0/1
209.17.220.0/30 is subnetted, 1 subnets
R 209.17.220.4 [120/1] via 172.29.3.9, 00:00:15, Serial0/0/0
R* 0.0.0.0/0 [120/1] via 172.29.3.9, 00:00:15, Serial0/0/0
Bogota3>

Medellin1>show ip route

172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
R 172.29.4.0/25 [120/1] via 172.29.6.1, 00:00:11, Serial0/0/1
R 172.29.4.128/25 [120/1] via 172.29.6.9, 00:00:04, Serial0/1/0
[120/1] via 172.29.6.13, 00:00:04, Serial0/1/1
C 172.29.6.0/30 is directly connected, Serial0/0/1
R 172.29.6.4/30 [120/1] via 172.29.6.9, 00:00:04, Serial0/1/0
[120/1] via 172.29.6.1, 00:00:11, Serial0/0/1
[120/1] via 172.29.6.13, 00:00:04, Serial0/1/1
C 172.29.6.8/30 is directly connected, Serial0/1/0
C 172.29.6.12/30 is directly connected, Serial0/1/1

c. Los routers Medellín2 y Bogotá2 también presentan redes conectadas directamente y recibidas mediante RIP.

Figura 1. Detalle de ip en Medellín y Bogotá



d. **Las tablas de los routers restantes deben permitir visualizar rutas redundantes para el caso de la ruta por defecto**.

```
Bogota1>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
R 172.29.0.0/24 [120/1] via 172.29.3.2, 00:00:10, Serial0/0/1
[120/1] via 172.29.3.6, 00:00:10, Serial0/1/1
R 172.29.1.0/24 [120/1] via 172.29.3.10, 00:00:13, Serial0/1/0
C 172.29.3.0/30 is directly connected, Serial0/0/1
C 172.29.3.4/30 is directly connected, Serial0/1/1
C 172.29.3.8/30 is directly connected, Serial0/1/0
R 172.29.3.12/30 [120/1] via 172.29.3.10, 00:00:13, Serial0/1/0
209.17.220.0/24 is variably subnetted, 2 subnets, 2 masks
C 209.17.220.4/30 is directly connected, Serial0/0/0
C 209.17.220.6/32 is directly connected, Serial0/0/0
S* 0.0.0.0/0 is directly connected, Serial0/0/0
        [1/0] via 209.17.220.6

Bogota3>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 172.29.3.1 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
C 172.29.0.0/24 is directly connected, FastEthernet0/0
S 172.29.1.0/24 [1/0] via 172.29.3.12
C 172.29.3.0/30 is directly connected, Serial0/0/0
C 172.29.3.4/30 is directly connected, Serial0/0/1
R 172.29.3.8/30 [120/1] via 172.29.3.1, 00:00:26, Serial0/0/0
```

[120/1] via 172.29.3.5, 00:00:26, Serial0/0/1
R 172.29.3.12/30 [120/2] via 172.29.3.1, 00:00:26, Serial0/0/0
[120/2] via 172.29.3.5, 00:00:26, Serial0/0/1
209.17.220.0/30 is subnetted, 1 subnets
R 209.17.220.4 [120/1] via 172.29.3.1, 00:00:26, Serial0/0/0
[120/1] via 172.29.3.5, 00:00:26, Serial0/0/1

Bogota3>

Medellin3>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is 172.29.6.10 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
S 172.29.4.0/25 [1/0] via 172.29.6.4
C 172.29.4.128/25 is directly connected, FastEthernet0/0
R 172.29.6.0/30 [120/1] via 172.29.6.10, 00:00:11, Serial0/0/0
[120/1] via 172.29.6.5, 00:00:26, Serial0/0/1
[120/1] via 172.29.6.14, 00:00:11, Serial0/1/1
C 172.29.6.4/30 is directly connected, Serial0/0/1
C 172.29.6.8/30 is directly connected, Serial0/0/0
C 172.29.6.12/30 is directly connected, Serial0/1/1
R* 0.0.0.0/0 [120/1] via 172.29.6.10, 00:00:11, Serial0/0/0
[120/1] via 172.29.6.14, 00:00:11, Serial0/1/1
User Access Verification
Password:

Medellin3>show ip route

Gateway of last resort is 172.29.6.10 to network 0.0.0.0

172.29.0.0/16 is variably subnetted, 6 subnets, 2 masks
S 172.29.4.0/25 [1/0] via 172.29.6.4
C 172.29.4.128/25 is directly connected, FastEthernet0/0
R 172.29.6.0/30 [120/1] via 172.29.6.10, 00:00:05, Serial0/0/0
[120/1] via 172.29.6.14, 00:00:05, Serial0/1/1
[120/1] via 172.29.6.5, 00:00:07, Serial0/0/1
C 172.29.6.4/30 is directly connected, Serial0/0/1

C 172.29.6.8/30 is directly connected, Serial0/0/0
C 172.29.6.12/30 is directly connected, Serial0/1/1
209.17.220.0/30 is subnetted, 1 subnets
R 209.17.220.0 [120/1] via 172.29.6.10, 00:00:05, Serial0/0/0
[120/1] via 172.29.6.14, 00:00:05, Serial0/1/1
R* 0.0.0.0/0 [120/1] via 172.29.6.10, 00:00:05, Serial0/0/0
0/1] via 172.29.6.5, 00:00:07, Serial0/0/1
C 172.29.6.4/30 is directly connected, Serial0/0/1
C 172.29.6.8/30 is directly connected, Serial0/0/0
C 172.29.6.12/30 is directly connected, Serial0/1/1
209.17.220.0/30 is subnetted, 1 subnets
R 209.17.220.0 [120/1] via 172.29.6.10, 00:00:05, Serial0/0/0
[120/1] via 172.29.6.14, 00:00:05, Serial0/1/1
R* 0.0.0.0/0 [120/1] via 172.29.6.10, 00:00:05, Serial0/0/0
[120/1] via 172.29.6.14, 00:00:05, Serial0/1/1

e. El router ISP solo debe indicar sus rutas estáticas adicionales a las directamente conectadas.

ISP>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

S 172.29.0.0/16 is directly connected, Serial0/0/0
is directly connected, Serial0/0/1
209.17.220.0/30 is subnetted, 2 subnets
C 209.17.220.0 is directly connected, Serial0/0/1 //Estas son las redes directamente conectadas
C 209.17.220.4 is directly connected, Serial0/0/0 //Estas son las redes directamente conectadas
ISP>

Parte 3: Deshabilitar la propagación del protocolo RIP.

a. Para no propagar las publicaciones por interfaces que no lo requieran se debe deshabilitar la propagación del protocolo RIP, en la siguiente tabla se indican las interfaces de cada router que no necesitan desactivación.

```
Medellin1(config)#router rip
Medellin1(config-router)#no network 172.29.6.8
Medellin1(config-router)#exit
Medellin1(config)#
Medellin2(config)#router rip
Medellin2(config-router)#no network 172.29.4.0
Medellin2(config-router)#exit
Medellin2(config)#
Medellin3(config)#router rip
Medellin3(config-router)#no network 172.29.0.0
Medellin3(config-router)#exit
Medellin3(config)#
Bogota2(config)#router rip
Bogota2(config-router)#no network 172.29.1.0
Bogota2(config-router)#exit
Bogota2(config)#
Bogota3(config)#router rip
Bogota3(config-router)#no network 172.29.0.0
Bogota3(config-router)#no network 172.29.3.8
Bogota3(config-router)#exit
```

Parte 4: Verificación del protocolo RIP.

a. Verificar y documentar las opciones de enrutamiento configuradas en los routers, como el **passive interface** para la conexión hacia el ISP, la versión de RIP y las interfaces que participan de la publicación entre otros datos.

Medellin1>show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 8 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip, static
Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
Serial0/1/0 2 2
Serial0/0/1 2 2
Serial0/1/1 2 2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
172.29.0.0
209.17.220.0
Passive Interface(s):
Serial0/0/0
Routing Information Sources:
Gateway Distance Last Update
172.29.6.1 120 00:00:05
172.29.6.9 120 00:00:17
172.29.6.13 120 00:00:17
Distance: (default is 120)

Medellin2>show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 12 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
Serial0/0/0 2 2
Serial0/0/1 2 2
Automatic network summarization is not in effect
Maximum path: 4

Routing for Networks:
172.29.0.0
Passive Interface(s):
FastEthernet0/0
Routing Information Sources:
Gateway Distance Last Update
172.29.6.2 120 00:00:00
172.29.6.6 120 00:00:00
Distance: (default is 120)

Medellin3>show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 2 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
Serial0/0/1 2 2
Serial0/0/0 2 2
Serial0/1/1 2 2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
172.29.0.0
Passive Interface(s):
FastEthernet0/0
Routing Information Sources:
Gateway Distance Last Update
172.29.6.10 120 00:00:26
172.29.6.14 120 00:00:26
172.29.6.5 120 00:00:13
Distance: (default is 120)

Bogota1>show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 11 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip, static
Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
Serial0/0/1 2 2

Serial0/1/1 2 2
Serial0/1/0 2 2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
172.29.0.0
209.17.220.0
Passive Interface(s):
Serial0/0/0
Routing Information Sources:
Gateway Distance Last Update
172.29.3.2 120 00:00:10
172.29.3.6 120 00:00:10
172.29.3.10 120 00:00:05
Distance: (default is 120)

Bogota2>show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 7 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
Serial0/0/1 2 2
Serial0/0/0 2 2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
172.29.0.0
Passive Interface(s):
FastEthernet0/0
Routing Information Sources:
Gateway Distance Last Update
172.29.3.9 120 00:00:03
Distance: (default is 120)

Bogota3>show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 25 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip

Default version control: send version 2, receive 2
Interface Send Recv Triggered RIP Key-chain
Serial0/0/0 2 2
Serial0/0/1 2 2
Automatic network summarization is not in effect
Maximum path: 4
Routing for Networks:
172.29.0.0
Passive Interface(s):
FastEthernet0/0
Routing Information Sources:
Gateway Distance Last Update
172.29.3.1 120 00:00:06
172.29.3.5 120 00:00:06
Distance: (default is 120)

b. Verificar y documentar la base de datos de RIP de cada router, donde se informa de manera detallada de todas las rutas hacia cada red.

Medellin1#show ip rip database
172.29.4.0/25 auto-summary
172.29.4.0/25
[1] via 172.29.6.1, 00:00:06, Serial0/0/1
172.29.4.128/25 auto-summary
172.29.4.128/25
[1] via 172.29.6.9, 00:00:15, Serial0/1/0 [1] via 172.29.6.13, 00:00:15, Serial0/1/1
172.29.6.0/30 auto-summary
172.29.6.0/30 directly connected, Serial0/0/1
172.29.6.4/30 auto-summary
172.29.6.4/30
[1] via 172.29.6.1, 00:00:06, Serial0/0/1 [1] via 172.29.6.9, 00:00:15, Serial0/1/0 [1] via 172.29.6.13, 00:00:15, Serial0/1/1
172.29.6.8/30 auto-summary
172.29.6.8/30 directly connected, Serial0/1/0
172.29.6.12/30 auto-summary
172.29.6.12/30 directly connected, Serial0/1/1
209.17.220.0/30 auto-summary
209.17.220.0/30 directly connected, Serial0/0/0
Medellin1#
Medellin2#show ip rip database
172.29.4.0/25 auto-summary
172.29.4.0/25 directly connected, FastEthernet0/0
172.29.4.128/25 auto-summary
172.29.4.128/25

[1] via 172.29.6.6, 00:00:10, Serial0/0/1
172.29.6.0/30 auto-summary
172.29.6.0/30 directly connected, Serial0/0/0
172.29.6.4/30 auto-summary
172.29.6.4/30 directly connected, Serial0/0/1
172.29.6.8/30 auto-summary
172.29.6.8/30
[1] via 172.29.6.2, 00:00:05, Serial0/0/0 [1] via 172.29.6.6, 00:00:10, Serial0/0/1
172.29.6.12/30 auto-summary
172.29.6.12/30
[1] via 172.29.6.2, 00:00:05, Serial0/0/0 [1] via 172.29.6.6, 00:00:10, Serial0/0/1
209.17.220.0/30 auto-summary
209.17.220.0/30
[1] via 172.29.6.2, 00:00:05, Serial0/0/0
Medellin2#

Medellin3#show ip rip database
172.29.4.0/25 auto-summary
172.29.4.0/25
[1] via 172.29.6.5, 00:00:11, Serial0/0/1
172.29.4.128/25 auto-summary
172.29.4.128/25 directly connected, FastEthernet0/0
172.29.6.0/30 auto-summary
172.29.6.0/30
[1] via 172.29.6.10, 00:00:18, Serial0/0/0 [1] via 172.29.6.14, 00:00:18, Serial0/1/1
[1] via 172.29.6.5, 00:00:11, Serial0/0/1
172.29.6.4/30 auto-summary
172.29.6.4/30 directly connected, Serial0/0/1
172.29.6.8/30 auto-summary
172.29.6.8/30 directly connected, Serial0/0/0
172.29.6.12/30 auto-summary
172.29.6.12/30 directly connected, Serial0/1/1
209.17.220.0/30 auto-summary
209.17.220.0/30
[1] via 172.29.6.10, 00:00:18, Serial0/0/0 [1] via 172.29.6.14, 00:00:18, Serial0/1/1

User Access Verification

Password:

Bogota1>enable
Password:
Bogota1#show ip rip database
172.29.0.0/24 auto-summary
172.29.0.0/24

[1] via 172.29.3.6, 00:00:23, Serial0/1/1 [1] via 172.29.3.2, 00:00:23, Serial0/0/1
172.29.1.0/24 auto-summary
172.29.1.0/24
[1] via 172.29.3.10, 00:00:11, Serial0/1/0
172.29.3.0/30 auto-summary
172.29.3.0/30 directly connected, Serial0/0/1
172.29.3.4/30 auto-summary
172.29.3.4/30 directly connected, Serial0/1/1
172.29.3.8/30 auto-summary
172.29.3.8/30 directly connected, Serial0/1/0
172.29.3.12/30 auto-summary
172.29.3.12/30
[1] via 172.29.3.6, 00:00:23, Serial0/1/1 [1] via 172.29.3.2, 00:00:23, Serial0/0/1 [1]
via 172.29.3.10, 00:00:11, Serial0/1/0
209.17.220.4/30 auto-summary
209.17.220.4/30 directly connected, Serial0/0/0

Bogota2#show ip rip database
0.0.0.0/0 auto-summary
0.0.0.0/0
[1] via 172.29.3.9, 00:00:25, Serial0/0/0
172.29.0.0/24 auto-summary
172.29.0.0/24
[2] via 172.29.3.9, 00:00:25, Serial0/0/0
172.29.1.0/24 auto-summary
172.29.1.0/24 directly connected, FastEthernet0/0
172.29.3.0/30 auto-summary
172.29.3.0/30
[1] via 172.29.3.9, 00:00:25, Serial0/0/0
172.29.3.4/30 auto-summary
172.29.3.4/30
[1] via 172.29.3.9, 00:00:25, Serial0/0/0
172.29.3.8/30 auto-summary
172.29.3.8/30 directly connected, Serial0/0/0
172.29.3.12/30 auto-summary
172.29.3.12/30 directly connected, Serial0/0/1
209.17.220.4/30 auto-summary
209.17.220.4/30
[1] via 172.29.3.9, 00:00:25, Serial0/0/0
Bogota2#

Bogota3#show ip rip database
0.0.0.0/0 auto-summary
0.0.0.0/0

[1] via 172.29.3.1, 00:00:18, Serial0/0/0 [1] via 172.29.3.5, 00:00:18, Serial0/0/1
172.29.0.0/24 auto-summary
172.29.0.0/24 directly connected, FastEthernet0/0
172.29.1.0/24 auto-summary
172.29.1.0/24
[2] via 172.29.3.1, 00:00:18, Serial0/0/0 [2] via 172.29.3.5, 00:00:18, Serial0/0/1
172.29.3.0/30 auto-summary
172.29.3.0/30 directly connected, Serial0/0/0
172.29.3.4/30 auto-summary
172.29.3.4/30 directly connected, Serial0/0/1
172.29.3.8/30 auto-summary
172.29.3.8/30
[1] via 172.29.3.1, 00:00:18, Serial0/0/0 [1] via 172.29.3.5, 00:00:18, Serial0/0/1
172.29.3.12/30 auto-summary
172.29.3.12/30
[2] via 172.29.3.1, 00:00:18, Serial0/0/0 [2] via 172.29.3.5, 00:00:18, Serial0/0/1
209.17.220.4/30 auto-summary
209.17.220.4/30
[1] via 172.29.3.1, 00:00:18, Serial0/0/0 [1] via 172.29.3.5, 00:00:18, Serial0/0/1

Parte 5: Configurar encapsulamiento y autenticación PPP.

a. Según la topología se requiere que el enlace Medellín1 con ISP sea configurado con autenticación PAT.

```
Medellin1>enable
Password:
Medellin1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Medellin1(config)#username ISP password marien
Medellin1(config)#interface serial 0/0/1
Medellin1(config-if)#interface serial 0/0/0
Medellin1(config-if)#ip address 209.17.220.1 255.255.255.252
Medellin1(config-if)#encapsulation ppp
Medellin1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to down

Medellin1(config-if)#ppp pap sent-
Medellin1(config-if)#ppp pap sent-username ISP pas
Medellin1(config-if)#ppp pap sent-username ISP password marien
PPP: Warning: You have chosen a username/password combination that
is valid for CHAP. This is a potential security hole.
Medellin1(config-if)#ppp pap sent-username ISP password
% Incomplete command.
Medellin1(config-if)#ppp pap sent-username ISP password marien
PPP: Warning: You have chosen a username/password combination that
is valid for CHAP. This is a potential security hole.
Medellin1(config-if)#
```

b. El enlace Bogotá1 con ISP se debe configurar con autenticación CHAT.

```
User Access Verification

Password:

Bogota1>enable
Password:
Bogota1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Bogota1(config)#username ISP password marien
Bogota1(config)#interface serial 0/0/0
Bogota1(config-if)#ip address 209.17.220.4 255.255.255.252
Bad mask /30 for address 209.17.220.4
```

```
Bogota1(config-if)#ip address 209.17.220.5 255.255.255.252
Bogota1(config-if)#encapsulation ppp
Bogota1(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to down

Bogota1(config-if)#ppp
Bogota1(config-if)#ppp authentication chap
Bogota1(config-if)#exit

ISP>enable
ISP#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ISP(config)#username Bogota1 password marien
ISP(config)#interface serial 0/0/0
ISP(config-if)#ip address 209.17.220.6 255.255.255.252
ISP(config-if)#encapsulation ppp
ISP(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up

ISP(config-if)#ppp authentication chap
ISP(config-if)#
```

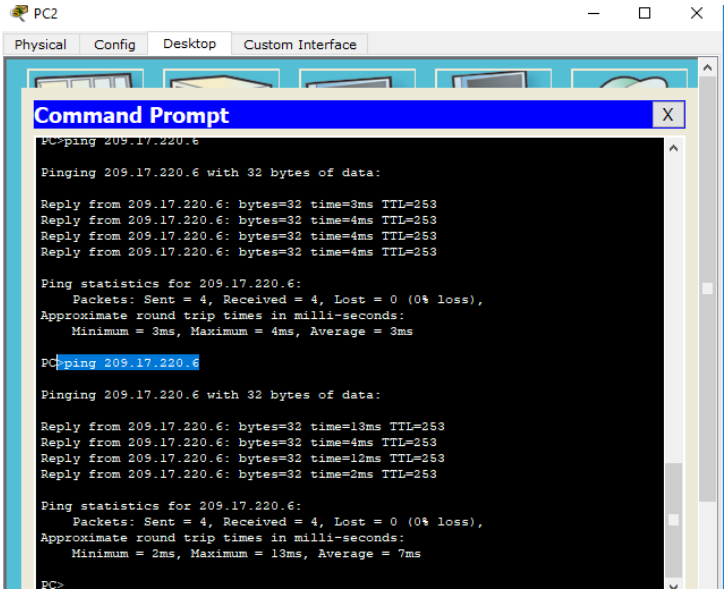
Parte 6: Configuración de PAT

a. En la topología, si se activa NAT en cada equipo de salida (Bogotá1 y Medellín1), los router internos de una ciudad no podrán llegar hasta los routers internos en el otro extremo, sólo existirá comunicación hasta los routers Bogotá1, ISP y Medellín1.

```
Medellin1>enable
Password:
Medellin1#configure t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin1(config)#ip nat inside source list 1 interface Serial0/1/1 overload
Medellin1(config)#access-list 1 permit 172.29.0.0 0.0.3.255
Medellin1(config)#interface Serial0/0/0
Medellin1(config-if)#ip nat outside
Medellin1(config-if)#
Medellin1(config-if)#int s0/0/1
Medellin1(config-if)#ip nat inside
Medellin1(config-if)#int s0/1/0
Medellin1(config-if)#ip nat inside
Medellin1(config-if)#int s0/1/1
Medellin1(config-if)#ip nat inside
Medellin1(config-if)#exit
Medellin1(config)#exit
```

b. Para verificar la correcta configuración procedemos a realzar un ping entre router ISP a la PC2.

Figura: 2 Ping pc2 a ISP



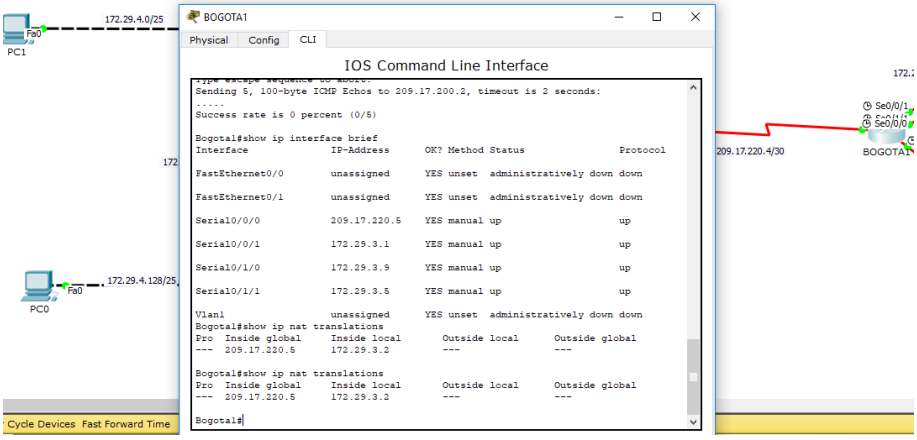
c. Después de verificar lo indicado en el paso anterior proceda a configurar el NAT en el router Medellín1. Compruebe que la traducción de direcciones indique las interfaces de entrada y de salida. Al realizar una prueba de ping, la dirección debe ser traducida automáticamente a la dirección de la interfaz serial 0/1/0 del router Medellín1, cómo diferente puerto.

Vlan1 unassigned YES unset administratively down down
Bogota1#show ip nat translations
Pro Inside global Inside local Outside local Outside global
--- 209.17.220.5 172.29.3.2 --- ---

Bogota1#show ip nat translations
Pro Inside global Inside local Outside local Outside global
--- 209.17.220.5 172.29.3.2 --- ---

Bogota1#

Figura: 3 configurar el NAT



d. **Proceda a configurar el NAT en el router Bogotá1. Compruebe que la traducción de direcciones indique las interfaces de entrada y de salida. Al realizar una prueba de ping, la dirección debe ser traducida automáticamente a la dirección de la interfaz serial 0/1/0 del router Bogotá1, cómo diferente puerto**.

User Access Verification

Password:

Bogota1>enable
Password:
Bogota1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Bogota1(config)#interface serial 0/0/0
Bogota1(config-if)#ip address 209.17.220.5 255.255.255.252
Bogota1(config-if)#ip nat inside
Bogota1(config-if)#interface serial0/0/1
Bogota1(config-if)#ip address 172.29.3.1 255.255.255.252
Bogota1(config-if)#ip nat inside
Bogota1(config-if)#interface serial 0/0/0
Bogota1(config-if)#ip address 209.17.220.5 255.255.255.252
Bogota1(config-if)#ip nat outside
Bogota1(config-if)#interface serial 0/1/0
Bogota1(config-if)#ip address 172.29.3.9 255.255.255.252
Bogota1(config-if)#ip nat inside
Bogota1(config-if)#interface serial 0/1/1
Bogota1(config-if)#ip address 172.29.3.5 255.255.255.252
Bogota1(config-if)#ip nat inside
Bogota1(config-if)#do wr
Building configuration...
[OK]
Bogota1(config-if)

Parte 7: Configuración del servicio DHCP.

a. Configurar la red Medellín2 y Medellín3 donde el router Medellín 2 debe ser el servidor DHCP para ambas redes LAN.

```
Medellin2>enable
Password:
Medellin2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Medellin2(config)#int
Medellin2(config)#interface fas
Medellin2(config)#interface fastEthernet 0/0
Medellin2(config-if)#ip address 172.29.4.1 255.255.255.128
Medellin2(config-if)#no shutdown
Medellin2(config-if)#exit
Medellin2(config)#ip dhcp pool Med2
Medellin2(dhcp-config)#network 172.29.4.0 255.255.255.128
Medellin2(dhcp-config)#default-router 172.29.4.1
Medellin2(dhcp-config)#exit
Medellin2(config)#do wr
Building configuration...
[OK]

Medellin2(config)#interface serial 0/0/1
Medellin2(config-if)#ip address 172.29.6.5 255.255.255.252
Medellin2(config-if)#no shutdown
Medellin2(config-if)#exit
Medellin2(config)#ip dhcp pool Med2
Medellin2(dhcp-config)#network 172.29.6.4 255.255.255.252
Medellin2(dhcp-config)#default-router 172.29.6.5
Medellin2(dhcp-config)#exit
Medellin2(config)#do wr
Building configuration...
[OK]
Medellin2(config)#
```

b. El router Medellín3 deberá habilitar el paso de los mensajes broadcast hacia la IP del router Medellín2.

```
User Access Verification
Password:
Medellin3>enable
Password:
Password:
```

```
Password:
Medellin3#configure t
Enter configuration commands, one per line. End with CNTL/Z.
Medellin3(config)#interface GigabitEthernet0/0
%Invalid interface type and number
Medellin3(config)#int fa0/0
Medellin3(config-if)#ip address 172.29.4.129 255.255.255.128
Medellin3(config-if)#ip helper-address 172.29.6.5
Medellin3(config-if)#duplex auto
Medellin3(config-if)#speed auto
Medellin3(config-if)#
```

c. **Configurar la red Bogotá2 y Bogotá3 donde el router Medellín2 debe ser el servidor DHCP para ambas redes Lan**.

```
User Access Verification
Password:
Bogota2>enable
Password:
Bogota2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Bogota2(config)#ip dhcp pool Bogota2
Bogota2(dhcp-config)#ip def
Bogota2(dhcp-config)#de
Bogota2(dhcp-config)#network 172.29.0.0 255.255.255.0
Bogota2(dhcp-config)#defa
Bogota2(dhcp-config)#default-router 172.29.0.1
Bogota2(dhcp-config)#exit
Bogota2(config)#d
Bogota2(config)#do
Bogota2(config)#do wr
Building configuration...
[OK]
Bogota2(config)#
```

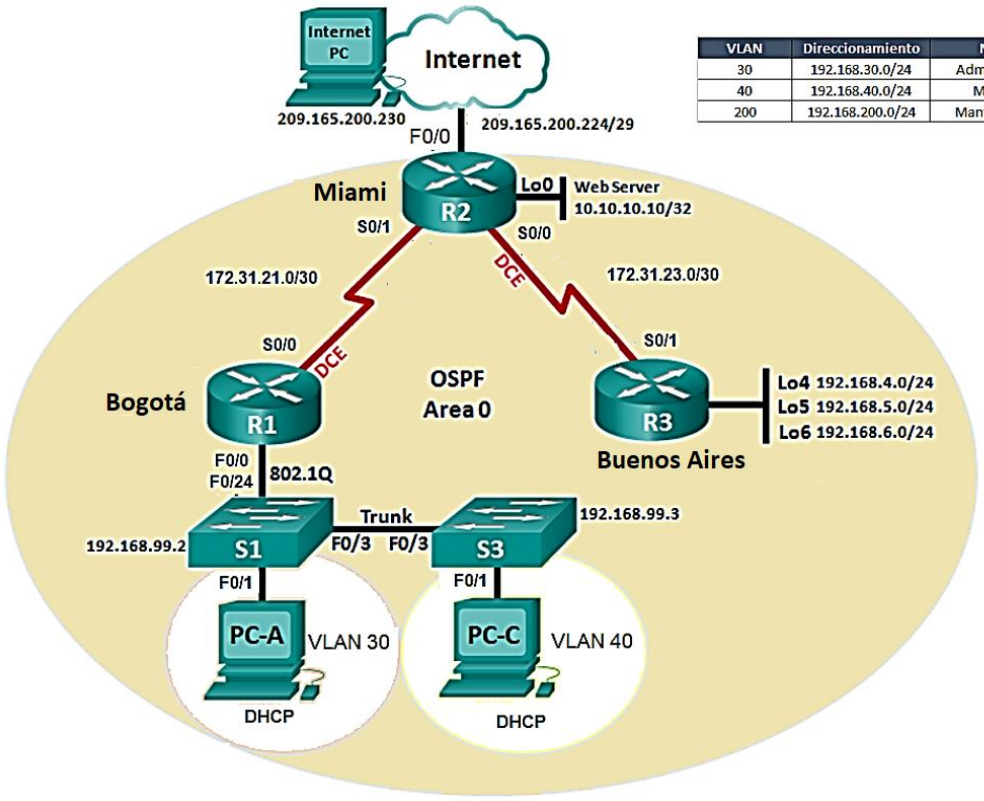
d. Configure el router Bogotá1 para que habilite el paso de los mensajes Broadcast hacia la IP del router Bogotá2.

```
User Access Verification
Password:

Bogota2>enable
Password:
Password:
Password:
```

```
Bogota2#configure t
Enter configuration commands, one per line. End with CNTL/Z.
Bogota2(config)#interface Serial0/1/1
Bogota2(config-if)#ip address 209.17.220.5 255.255.255.252
Bogota2(config-if)#encapsulation ppp
Bogota2(config-if)#ppp authentication chap
Bogota2(config-if)#ip nat outside
Bogota2(config-if)#
```

Escenario 2: Una empresa de Tecnología posee tres sucursales distribuidas en las ciudades de Miami, Bogotá y Buenos Aires, en donde el estudiante será el administrador de la red, el cual deberá configurar e interconectar entre sí cada uno de los dispositivos que forman parte del escenario, acorde con los lineamientos establecidos para el direccionamiento IP, protocolos de enrutamiento y demás aspectos que forman parte de la topología de red.



VLAN	Direccionamiento	Nombre
30	192.168.30.0/24	Administración
40	192.168.40.0/24	Mercadeo
200	192.168.200.0/24	Mantenimiento

CONFIGURAR EL DIRECCIONAMIENTO IP ACORDE CON LA TOPOLOGÍA DE RED PARA CADA UNO DE LOS DISPOSITIVOS QUE FORMAN PARTE DEL ESCENARIO

CONFIGURACION BOGOTA (R1)

```
Router>enable
Password:
Router#configure t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Router
Router(config)#no ip domain-lookup
Router(config)#
Router(config)#enable secret class
Router(config)#line con 0
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#logging synchronous
Router(config-line)#exit
Router(config)#line vty 0 4
Router(config-line)#password cisco
Router(config-line)#login
Router(config-line)#logging synchronous
Router(config-line)#exit
Router(config)#service password-encryption
Router(config)#banner motd #Prohibido el acceso a personal no autorizado#
Router(config)#interface s0/0/0
Router(config-if)#ip address 172.31.21.1 255.255.255.252
Router(config-if)#clock rate 128000
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#ip route 0.0.0.0 0.0.0.0 s0/0/0
Router(config)#int g0/1.30
Router (config-subif)#description Administracion LAN
R1(config-subif)#encapsulation dot1q 30
Router (config-subif)# ip address 192.168.30.1 255.255.255.0

Router(config-subif)#int g0/1.40
Router(config-subif)#description Mercadeo LAN
Router(config-subif)# encapsulation dot1q 40
Router(config-subif)# ip address 192.168.40.1 255.255.255.0
Router(config-subif)#int g0/1.200

Router(config)#int g0/0
Router(config-if)#no shutdown
```

Router (config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/0.30, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/0.40, changed state to up
%LINK-5-CHANGED: Interface GigabitEthernet0/0.200, changed state to up

CONFIGURACION MIAMI (R2)

Router(config)#hostname MIAMI
MIAMI(config)#no ip domain-lookup
MIAMI(config)#enable secret class
MIAMI(config)#line con 0
MIAMI(config-line)#password cisco
MIAMI(config-line)#login
MIAMI(config-line)#logging synchronous
MIAMI(config-line)#exit
MIAMI(config)#line vty 0 4
MIAMI(config-line)#password cisco
MIAMI(config-line)#login
MIAMI(config-line)#logging synchronous
MIAMI(config-line)#exit
MIAMI(config)#service password-encryption
MIAMI(config)#banner motd #prohibido el acceso a personal no autorizado#

MIAMI(config)#interface s0/0/1
MIAMI(config-if)#ip address 172.31.21.2 255.255.255.252
MIAMI(config-if)#no shutdown
MIAMI(config-if)#interface s0/0/0
MIAMI(config-if)#ip address 172.31.23.1 255.255.255.252
MIAMI(config-if)#clock rate 128000
MIAMI(config-if)#no shutdown
MIAMI(config-if)#interface g0/0
MIAMI (config-if)#ip address 209.165.200.225 255.255.255.248
MIAMI(config-if)#no shutdown

*"*Configuración de interface g0/1, asignación de IP según le corresponde"
MIAMI(config-if)#interface g0/1
MIAMI(config-if)#ip address 10.10.10.1 255.255.255.0
MIAMI (config-if)#no shutdown
MIAMI(config-if)#exit
MIAMI(config)# ip route 0.0.0.0 0.0.0.0 g0/0

MIAMI(config)#router ospf 1
MIAMI(config-router)#router-id 5.5.5.5
MIAMI(config-router)#network 172.31.21.0 0.0.0.3 area 0

MIAMI(config-router)#network 172.31.23.0 0.0.0.3 area
MIAMI(config-router)#passive-interface g0/1
MIAMI(config-if)#bandwidth 256
MIAMI(config-if)#int s0/0/1 R2(config-if)#bandwidth 256
MIAMI(config-if)#int s0/0/0
MIAMI(config-if)#ip ospf cost 9500
MIAMI(config)#ip nat inside source static 10.10.10.10 209.165.200.229
MIAMI(config-if)#no shutdown

“Configuración de interface g0/0”

MIAMI(config)#int g0/0
MIAMI(config-if)#ip nat outside R2(config-if)#ip nat outside
MIAMI(config-if)#int g0/1 R2(config-if)#ip nat inside
MIAMI(config)#access-list 1 permit 192.168.30.0 0.0.0.255
MIAMI(config)#access-list 1 permit 192.168.33.0 0.0.0.255
MIAMI(config)#access-list 1 permit 192.168.4.0 0.0.3.255
MIAMI(config)#ip nat pool INTERNET 209.165.200.230 209.165.200.248
MIAMI(config)#ip nat inside source list 1 pool INTERNET
MIAMI(config-if)#no shutdown

CONFIGURACION BUENOS_AIRES (R3)

Router(config)#hostname Buenos_Aires
Buenos_Aires(config)#no ip domain-lookup
Buenos_Aires (config)#enable secret class
Buenos_Aires (config)#line con 0
Buenos_Aires (config-line)#password cisco
Buenos_Aires (config-line)#login
Buenos_Aires (config-line)#logging synchronous
Buenos_Aires (config-line)#exit
Buenos_Aires (config)#line vty 0 4
Buenos_Aires (config-line)#password cisco
Buenos_Aires (config-line)#login
Buenos_Aires (config-line)#logging synchronous
Buenos_Aires (config-line)#exit
Buenos_Aires (config)#service password-encryption
Buenos_Aires (config)#banner motd #Prohibido el acceso a personal no autorizado#
Buenos_Aires(config)#
Buenos_Aires(config)#interface s0/0/1
Buenos_Aires(config-if)#ip address 172.31.23.2 255.255.255.252
Buenos_Aires(config-if)#no shutdown
“Configuración de la interfaz lógica del Router”

```
Buenos_Aires(config-if)#interface loopback 4
Buenos_Aires(config-if)#
Buenos_Aires(config-if)#ip addres 192.168.4.1 255.255.255.0
Buenos_Aires(config-if)#no shutdown
Buenos_Aires(config-if)#interface loopback 5
Buenos_Aires(config-if)#
Buenos_Aires (config-if)#ip addres 192.168.5.1 255.255.255.0
Buenos_Aires (config-if)#no shutdown
Buenos_Aires(config-if)#interface loopback 6
Buenos_Aires(config-if)#
Buenos_Aires(config-if)#ip addres 192.168.6.1 255.255.255.0
Buenos_Aires(config-if)#no shutdown
Buenos_Aires(config-if)#ip route 0.0.0.0 0.0.0.0 s0/0/1
Buenos_Aires(config-if)#exit
Buenos_Aires(config)#
Buenos_Aires(config)#router ospf 1
Buenos_Aires(config-router)#router-id 8.8.8.8
Buenos_Aires(config-router)#passive-interface g0/1
Buenos_Aires(config-router)#int s0/0/1
Buenos_Aires(config-if)#bandwidth 256
Buenos_Aires (config-if)#ip ospf cost 9500
```

CONFIGURACION SWITCH (S1)

```
Switch#configure t
Enter configuration commands, one per line. End with CNTL/Z.
S1(config)#hostname S1
S1(config)#no ip domain-lookup
S1(config)#enable secret class
S1(config)#line con 0
S1(config-line)#password cisco
S1(config-line)#login
S1(config-line)#logging synchronous
S1(config-line)#exit
S1(config)#line vty 0 4
S1(config-line)#password cisco
S1(config-line)#login
S1(config-line)#logging synchronous
S1(config-line)#exit
S1(config)#service password-encryption
S1(config)#banner motd #Prohibido el acceso a personal no autorizado#
S1(config)#
S1(config)#vlan 30
S1(config-vlan)#name Administración
```

S1(config)#vlan 40
S1(config-vlan)#name Mercadeo
S1(config)#vlan 200
S1(config-vlan)#name Mantenimiento
S1(config-vlan)#int vlan 200
S1(config-if)#ip address 192.168.99.2 255.255.255.0
S1(config-if)#no shut
S1(config-if)#exit
S1(config)#ip default-gateway 192.168.99.1
S1(config)#int f0/3
S1(config-if)#switchport mode trunk
S1(config-if)#switchport trunk native vlan 1
S1(config-if)#int rango fa0/1-2, fa0/4, fa0/6-24, g1/1-2
S1(config)#int fa0/6
S1(config-if)#switchport mode Access
S1(config-if)#switchport Access vlan 30
S1(config-if)#int rango fa0/1-2, fa0/4, fa0/7-24, g1/1-2
S1(config-if-range)#shutdown
S1(config)#int vlan 200
S1(config-if)#
%LINK-5-CHANGED: Interface Vlan200, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan200, changed state to up

CONFIGURACION SWITCH (S3)

Switch#configure t
Enter configuration commands, one per line. End with CNTL/Z.
S3 (config)#hostname S3
S3 (config)#no ip domain-lookup
S3 (config)#enable secret class
S3 (config)#line con 0
S3 (config-line)#password cisco
S3 (config-line)#login
S3 (config-line)#logging synchronous
S3 (config-line)#exit
S3 (config)#line vty 0 4
S1(config-line)#password cisco
S3 (config-line)#login
S3 (config-line)#logging synchronous
S3 (config-line)#exit
S3 (config)#service password-encryption
S3 (config)#banner motd #Prohibido el acceso a personal no autorizado#
S3(config)#exit
S3(config)#vlan 30

```
S3(config-vlan)#name Administracion
S3(config-vlan)#vlan 40
S3(config-vlan)#name mercadeo
S3(config-vlan)#vlan 200
S3(config-vlan)#name Mantenimiento
S3(config-vlan)#exit
S3(config)#int vlan 200
S3(config-if)#
%LINK-5-CHANGED: Interface Vlan200, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan200, changed state to up
S3 (config-if)#ip address 192.168.99.3 255.255.255.0
S3 (config-if)#no shut
S3 (config-if)#exit
S3 (config)#ip default-gateway 192.168.99.1
S3 (config)#int f0/3
S3 (config-if)#switchport mode trunk
S3 (config-if)#switchport trunk vlan 1
S3 (config-if)#int rango fa0/1-2, fa0/4-24, g1/1-2
S3 (config)#int fa0/18
S3 (config-if)#switchport mode Access
S3 (config-if)#switchport Access vlan 40
S3 (config)#int rango fa0/1-2, fa0/4-17, fa0/19-24, g1/1-2
S3(config-if-range)#shutdown
```

CONFIGURAR EL PROTOCOLO DE ENRUTAMIENTO OSPFV2 BAJO LOS SIGUIENTES CRITERIOS:

Tabla 1: OSPFv2 area 0

Configuration Item or Task	Specification
Router ID R1	1.1.1.1
Router ID R2	5.5.5.5
Router ID R3	8.8.8.8
Configurar todas las interfaces LAN como pasivas	
Establecer el ancho de banda para enlaces seriales en	256 Kb/s
Ajustar el costo en la métrica de S0/0 a	9500

CONFIGURACION DE ENRUTAMIENTO OSPFV2 BOGOTÁ (R1)

```
Router(config)#router ospf 1
Router(config-router)#router-id 1.1.1.1
Router(config-router)#network 172.31.21.0 0.0.0.3 area 0
Router (config-router)#network 192.168.30.0 0.0.0.255 area 0
Router(config-router)#network 192.168.40.0 0.0.0.255 area 0
Router(config-router)#network 192.168.200.0 0.0.0.255 area 0
Router(config-router)#passive-interface g0/0.30
Router(config-router)#passive-interface g0/0.40
Router(config-router)#passive-interface g0/0.200
Router(config-router)#exit
Router(config)#int s0/0/0
Router(config-if)#bandwidth 256
Router(config-if)#ip ospf cost 9500
Router(config-if)#exit
Router(config)#ip dhcp excluded-address 192.168.30.1 192.168.30.30
Router(config)#ip dhcp excluded-address 192.168.40.1 192.168.40.30
Router(config)#ip dhcp pool ADMINISTRACION
Router(dhcp-config)#dns-server 10.10.10.11
Router(dhcp-config)#domain-name ccna-unad.com
^
% Invalid input detected at '^' marker.
Router(dhcp-config)#default-router 192.168.30.1
Router(dhcp-config)#network 192.168.30.0 255.255.255.0
Router(dhcp-config)#ip dhcp pool MERCADEO
Router(dhcp-config)#dns-server 10.10.10.11
Router(dhcp-config)#domain-name ccna-unad.com
^
% Invalid input detected at '^' marker.
Router(dhcp-config)#default-router 192.168.40.1
```

Router (dhcp-config)#network 192.168.40.0 255.255.255.0

CONFIGURACION DE ENRUTAMIENTO OSPFV2 MIAMI (R2)

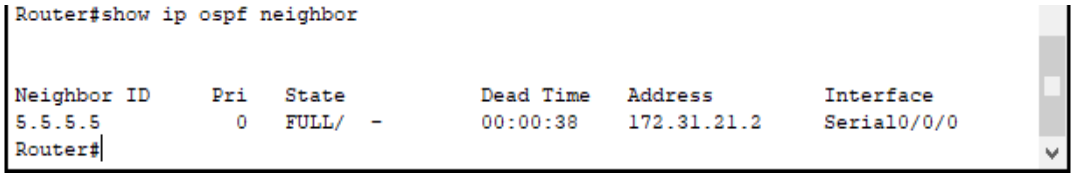
MIAMI(config)#router ospf 1
MIAMI(config-router)#router-id 5.5.5.5
MIAMI(config-router)#network 172.31.21.0 0.0.0.3 area 0
MIAMI(config-router)#network 172.31.23.0 0.0.0.3 area
MIAMI(config-router)#passive-interface g0/1
MIAMI(config-if)#bandwidth 256
MIAMI(config-if)#int s0/0/1 R2(config-if)#bandwidth 256
MIAMI(config-if)#int s0/0/0
MIAMI(config-if)#ip ospf cost 9500
MIAMI(config)#ip nat inside source static 10.10.10.10 209.165.200.229
MIAMI(config-if)#no shutdown

CONFIGURACION DE ENRUTAMIENTO OSPFV2 BUENOS_AIRES (R3)
Buenos_Aires(config)#router ospf 1
Buenos_Aires(config-router)#router-id 8.8.8.8
Buenos_Aires(config-router)#network 172.31.23.0 0.0.0.3 area 0
Buenos_Aires(config-router)#
00:05:10: %OSPF-5-ADJCHG: Process 1, Nbr 5.5.5.5 on Serial0/0/1 from LOADING to FULL, Loading Done
Buenos_Aires(config-router)#network 192.168.4.0 0.0.3.255 area 0
Buenos_Aires(config-router)#passive-interface lo4
Buenos_Aires(config-router)#passive-interface lo5
Buenos_Aires(config-router)#passive-interface lo6
Buenos_Aires(config-router)#exit
Buenos_Aires(config-router)#int s0/0/1
Buenos_Aires(config-if)#bandwidth 256
Buenos_Aires (config-if)#ip ospf cost 9500

VERIFICAR INFORMACIÓN DE OSPF

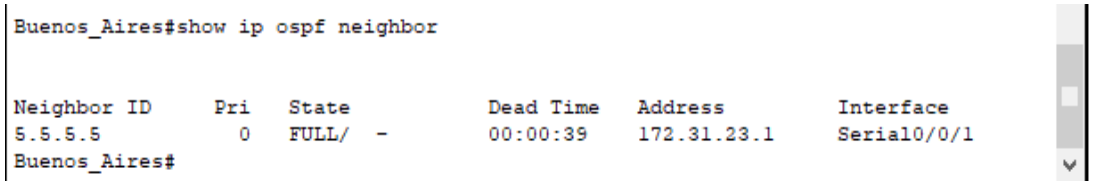
- Visualizar tablas de enrutamiento y routers conectados por OSPFv2

Figura: 4 visualizaciones tabla de enrutamiento



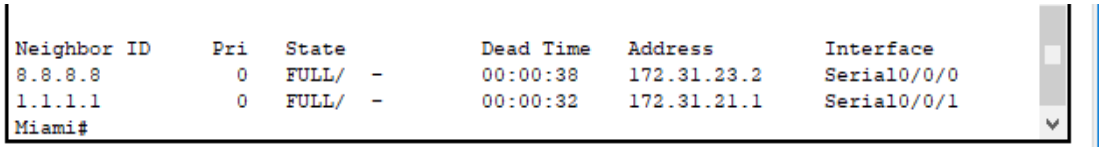
```
Router#show ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
5.5.5.5           0   FULL/  -        00:00:38    172.31.21.2     Serial0/0/0
Router#
```



```
Buenos_Aires#show ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
5.5.5.5           0   FULL/  -        00:00:39    172.31.23.1     Serial0/0/1
Buenos_Aires#
```



```
Neighbor ID     Pri   State           Dead Time   Address         Interface
8.8.8.8           0   FULL/  -        00:00:38    172.31.23.2     Serial0/0/0
1.1.1.1           0   FULL/  -        00:00:32    172.31.21.1     Serial0/0/1
Miami#
```

VISUALIZAR LISTA RESUMIDA DE INTERFACES POR OSPF EN DONDE SE ILUSTRE EL COSTO DE CADA INTERFACE.

Interfaces por ospf router (r1)

Password:

Router>enable
Password:
Router#show ip ospf interface

GigabitEthernet0/0.40 is up, line protocol is up
Internet address is 192.168.40.1/24, Area 0
Process ID 1, Router ID 1.1.1.1, Network Type BROADCAST, Cost: 1
Transmit Delay is 1 sec, State DR, Priority 1
Designated Router (ID) 1.1.1.1, Interface address 192.168.40.1
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
No Hellos (Passive interface)
Index 1/1, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 0, Adjacent neighbor count is 0
Suppress hello for 0 neighbor(s)
Serial0/0/0 is up, line protocol is up
Internet address is 172.31.21.1/30, Area 0
Process ID 1, Router ID 1.1.1.1, Network Type POINT-TO-POINT, Cost: 9500
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:01
Index 2/2, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1 , Adjacent neighbor count is 1
Adjacent with neighbor 5.5.5.5
Suppress hello for 0 neighbor(s)
Router#
Router#

INTERFACES POR OSPF MIAMI (R2)

Password:

Miami>enable
Password:
Miami#show ip ospf interface

GigabitEthernet0/1 is up, line protocol is up
Internet address is 10.10.10.1/24, Area 0
Process ID 1, Router ID 5.5.5.5, Network Type BROADCAST, Cost: 1
Transmit Delay is 1 sec, State DR, Priority 1
Designated Router (ID) 5.5.5.5, Interface address 10.10.10.1
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
No Hellos (Passive interface)
Index 1/1, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 0, Adjacent neighbor count is 0
Suppress hello for 0 neighbor(s)
Serial0/0/0 is up, line protocol is up
Internet address is 172.31.23.1/30, Area 0
Process ID 1, Router ID 5.5.5.5, Network Type POINT-TO-POINT, Cost: 9500
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:08
Index 2/2, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1 , Adjacent neighbor count is 1
Adjacent with neighbor 8.8.8.8
Suppress hello for 0 neighbor(s)
Serial0/0/1 is up, line protocol is up
Internet address is 172.31.21.2/30, Area 0
Process ID 1, Router ID 5.5.5.5, Network Type POINT-TO-POINT, Cost: 390
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:06

Index 3/3, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1 , Adjacent neighbor count is 1
Adjacent with neighbor 1.1.1.1
Suppress hello for 0 neighbor(s)
Miami#

INTERFACES POR OSPF BUENOS_AIRES (R2)

Buenos_Aires#show ip ospf interface

Loopback4 is up, line protocol is up
Internet address is 192.168.4.1/24, Area 0
Process ID 1, Router ID 8.8.8.8, Network Type LOOPBACK, Cost: 1
Loopback interface is treated as a stub Host
Loopback5 is up, line protocol is up
Internet address is 192.168.5.1/24, Area 0
Process ID 1, Router ID 8.8.8.8, Network Type LOOPBACK, Cost: 1
Loopback interface is treated as a stub Host
Loopback6 is up, line protocol is up
Internet address is 192.168.6.1/24, Area 0
Process ID 1, Router ID 8.8.8.8, Network Type LOOPBACK, Cost: 1
Loopback interface is treated as a stub Host
Serial0/0/1 is up, line protocol is up
Internet address is 172.31.23.2/30, Area 0
Process ID 1, Router ID 8.8.8.8, Network Type POINT-TO-POINT, Cost: 9500
Transmit Delay is 1 sec, State POINT-TO-POINT, Priority 0
No designated router on this network
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
Hello due in 00:00:04
Index 4/4, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 1 , Adjacent neighbor count is 1
Adjacent with neighbor 5.5.5.5
Suppress hello for 0 neighbor(s)
Buenos_Aires#

- **VISUALIZAR EL OSPF PROCESS ID, ROUTER ID, ADDRESS SUMMARIZATIONS, ROUTING NETWORKS, AND PASSIVE INTERFACES CONFIGURADAS EN CADA ROUTER**.

OSPF PROCESS ID, ROUTER ID, ADDRESS ROUTER (R1)

Router#show ip protocols

Routing Protocol is "ospf 1"
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Router ID 1.1.1.1
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Maximum path: 4
Routing for Networks:
172.31.21.0 0.0.0.3 area 0
192.168.30.0 0.0.0.255 area 0
192.168.40.0 0.0.0.255 area 0
192.168.200.0 0.0.0.255 area 0
Passive Interface(s):
GigabitEthernet0/0.40
GigabitEthernet0/1.30
GigabitEthernet0/1.200
Routing Information Sources:
Gateway Distance Last Update
1.1.1.1 110 00:04:55
5.5.5.5 110 00:04:54
8.8.8.8 110 00:04:54
Distance: (default is 110)
Router#

Router#show ip ospf
Routing Process "ospf 1" with ID 1.1.1.1
Supports only single TOS(TOS0) routes
Supports opaque LSA
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
Number of external LSA 0. Checksum Sum 0x000000
Number of opaque AS LSA 0. Checksum Sum 0x000000
Number of DCbitless external and opaque AS LSA 0
Number of DoNotAge external and opaque AS LSA 0
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
External flood list length 0
Area BACKBONE(0)

Number of interfaces in this area is 2
Area has no authentication
SPF algorithm executed 3 times
Area ranges are
Number of LSA 3. Checksum Sum 0x017288
Number of opaque link LSA 0. Checksum Sum 0x000000
Number of DCbitless LSA 0
Number of indication LSA 0
Number of DoNotAge LSA 0
Flood list length 0
Router#
Miami#

OSPF PROCESS ID, ROUTER ID, ADDRESS MIAMI (R2)

Miami#**show ip protocols**
Routing Protocol is "ospf 1"
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Router ID 5.5.5.5
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Maximum path: 4
Routing for Networks:
172.31.21.0 0.0.0.3 area 0
172.31.23.0 0.0.0.3 area 0
10.10.10.0 0.0.0.255 area 0
Passive Interface(s):
GigabitEthernet0/1
Routing Information Sources:
Gateway Distance Last Update
1.1.1.1 110 00:09:12
5.5.5.5 110 00:09:12
8.8.8.8 110 00:09:12
Distance: (default is 110)
Miami#show ip ospf
Routing Process "ospf 1" with ID 5.5.5.5
Supports only single TOS(TOS0) routes
Supports opaque LSA
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
Number of external LSA 0. Checksum Sum 0x000000
Number of opaque AS LSA 0. Checksum Sum 0x000000
Number of DCbitless external and opaque AS LSA 0
Number of DoNotAge external and opaque AS LSA 0

Number of areas in this router is 1. 1 normal 0 stub 0 nssa
External flood list length 0
Area BACKBONE(0)
Number of interfaces in this area is 3
Area has no authentication
SPF algorithm executed 2 times
Area ranges are
Number of LSA 3. Checksum Sum 0x017288
Number of opaque link LSA 0. Checksum Sum 0x000000
Number of DCbitless LSA 0
Number of indication LSA 0
Number of DoNotAge LSA 0
Flood list length 0
Miami#

OSPF PROCESS ID, ROUTER ID, ADDRESS BUENOS_AIRES(R3)

Buenos_Aires#
Buenos_Aires#show ip protocols
Routing Protocol is "ospf 1"
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Router ID 8.8.8.8
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
Maximum path: 4
Routing for Networks:
172.31.23.0 0.0.0.3 area 0
192.168.4.0 0.0.3.255 area 0
Passive Interface(s):
Loopback4
Loopback5
Loopback6
Routing Information Sources:
Gateway Distance Last Update
1.1.1.1 110 00:10:02
5.5.5.5 110 00:10:02
8.8.8.8 110 00:10:02
Buenos_Aires#show ip ospf
Routing Process "ospf 1" with ID 8.8.8.8
Supports only single TOS(TOS0) routes
Supports opaque LSA
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
Number of external LSA 0. Checksum Sum 0x000000
Number of opaque AS LSA 0. Checksum Sum 0x000000

Number of DCbitless external and opaque AS LSA 0
Number of DoNotAge external and opaque AS LSA 0
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
External flood list length 0
Area BACKBONE(0)
Number of interfaces in this area is 4
Area has no authentication
SPF algorithm executed 3 times
Area ranges are
Number of LSA 3. Checksum Sum 0x017288
Number of opaque link LSA 0. Checksum Sum 0x000000
Number of DCbitless LSA 0
Number of indication LSA 0
Number of DoNotAge LSA 0
Flood list length 0
Buenos_Aires#

CONFIGURAR VLANS, PUERTOS TRONCALES, PUERTOS DE ACCESO, ENCAPSULAMIENTO, INTER-VLAN ROUTING Y SEGURIDAD EN LOS SWITCHES ACORDE A LA TOPOLOGÍA DE RED ESTABLECIDA.

Configuración Switch (S1)

```
S1(config)#vlan 30
S1(config-vlan)#name Administración
S1(config)#vlan 40
S1(config-vlan)#name Mercadeo
S1(config)#vlan 200
S1(config-vlan)#name Mantenimiento
S1(config-vlan)#int vlan 200
S1(config-if)#ip address 192.168.99.2 255.255.255.0
S1(config-if)#no shut
S1(config-if)#exit
S1(config)#ip default-gateway 192.168.99.1
S1(config)#int f0/3
S1(config-if)#switchport mode trunk
S1(config-if)#switchport trunk native vlan 1
S1(config-if)#int rango fa0/1-2, fa0/4, fa0/6-24, g1/1-2
S1(config)#int fa0/6
S1(config-if)#switchport mode Access
S1(config-if)#switchport Access vlan 30
S1(config-if)#int rango fa0/1-2, fa0/4, fa0/7-24, g1/1-2
S1(config-if-range)#shutdown
S1(config)#int vlan 200
S1(config-if)#
```

Configuración Switch (S2)

```
S3(config)#vlan 30
S3(config-vlan)#name Administracion
S3(config-vlan)#vlan 40
S3(config-vlan)#name mercadeo
S3(config-vlan)#vlan 200
S3(config-vlan)#name Mantenimiento
S3(config-vlan)#exit
S3(config)#int vlan 200
S3(config-if)#
%LINK-5-CHANGED: Interface Vlan200, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan200, changed state to up
```

S3 (config-if)#ip address 192.168.99.3 255.255.255.0
S3 (config-if)#no shut
S3 (config-if)#exit
S3 (config)#ip default-gateway 192.168.99.1
S3 (config)#int f0/3
S3 (config-if)#switchport mode trunk
S3 (config-if)#switchport trunk vlan 1
S3 (config-if)#int rango fa0/1-2, fa0/4-24, g1/1-2
S3 (config)#int fa0/18
S3 (config-if)#switchport mode Access
S3 (config-if)#switchport Access vlan 40
S3 (config)#int rango fa0/1-2, fa0/4-17, fa0/19-24, g1/1-2
S3(config-if-range)#shutdown

En el Switch 3 deshabilitar DNS lookup

S1#configure t
Enter configuration commands, one per line. End with CNTL/Z.
S1(config)#hostname S1
S1(config)#no ip domain-lookup
S1(config)#enable secret class
S1(config)#line con 0

Asignar direcciones IP a S1 de acuerdo a los lineamientos.

S1(config-vlan)#int vlan 200
S1(config-if)#ip address 192.168.99.2 255.255.255.0
S1(config-if)#no shut

Asignar direcciones IP a S2 de acuerdo a los lineamientos.

S3(config)#int vlan 200
S3(config-if)#
%LINK-5-CHANGED: Interface Vlan200, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan200, changed state to up
S3 (config-if)#ip address 192.168.99.3 255.255.255.0
S3 (config-if)#no shut

Desactivar todas las interfaces que no sean utilizadas en el esquema de red.

```
S1(config)#int range fa0/2-24
S1(config-if-range)#no sh
S1(config-if-range)#
S1(config-if-range)#

S3(config)#int range fa0/2-24
S3(config-if-range)#no sh
S3(config-if-range)#
```

Implement DHCP and NAT for IPv4

```
Router(config)#ip dhcp excluded-address 192.168.30.1 192.168.30.30
Router(config)#ip dhcp excluded-address 192.168.40.1 192.168.40.30
```

Configurar R1 como servidor DHCP para las VLANs 30 y 40.

```
Router(config)#ip dhcp pool ADMINISTRACION
Router(dhcp-config)#dns-server 10.10.10.11
Router(dhcp-config)#domain-name ccna-unad.com
^
% Invalid input detected at '^' marker.
```

Nota: domain-name ccna-unad.com nunca funciono.

Reservar las primeras 30 direcciones IP de las VLAN 30 y 40 para configuraciones estáticas.

```
Router(config)#ip dhcp excluded-address 192.168.30.1 192.168.30.30
Router(config)#ip dhcp excluded-address 192.168.40.1 192.168.40.30
```

Configurar NAT en R2 para permitir que los host puedan salir a internet

MIAMI(config)#ip nat inside source static 10.10.10.10 209.165.200.229
MIAMI(config-if)#no shutdown

Se configura en R2 un grupo NAT que llamaremos RUT2POOL, donde se configuran algunas direcciones de 209.165.200.224/29, para esto se usan estas órdenes.

MIAMI(config)#ip nat pool INTERNET 209.165.200.225 209.165.200.228 netmask 255.255.255.248
MIAMI(config)#ip nat inside source list 1 pool INTERNET

Configurar al menos dos listas de acceso de tipo estándar a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.

MIAMI(config)#int g0/0
MIAMI(config-if)#ip nat outside R2(config-if)#ip nat outside
MIAMI(config-if)#int g0/1 R2(config-if)#ip nat inside
MIAMI(config)#access-list 1 permit 192.168.30.0 0.0.0.255
MIAMI(config)#access-list 1 permit 192.168.33.0 0.0.0.255
MIAMI(config)#access-list 1 permit 192.168.4.0 0.0.3.255

Configurar al menos dos listas de acceso de tipo extendido o nombradas a su criterio en para restringir o permitir tráfico desde R1 o R3 hacia R2.

User Access Verification

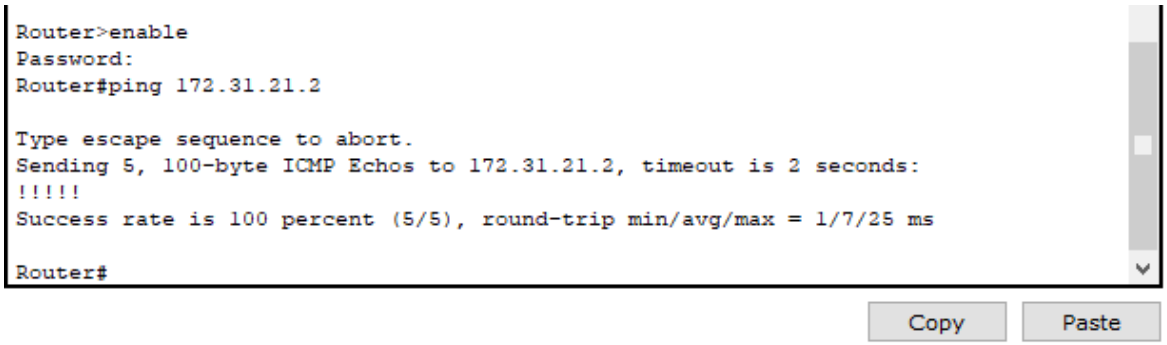
Password:

Buenos_Aires>enable
Password:
Buenos_Aires#configure t
Enter configuration commands, one per line. End with CNTL/Z.
Buenos_Aires(config)#router rip
Buenos_Aires(config-router)#version 2
Buenos_Aires(config-router)#do show ip route connected
C 172.31.23.0/30 is directly connected, Serial0/0/1
C 192.168.4.0/24 is directly connected, Loopback4
C 192.168.5.0/24 is directly connected, Loopback5
C 192.168.6.0/24 is directly connected, Loopback6
Buenos_Aires(config-router)#

Verificar procesos de comunicación y re-direccionamiento de tráfico en los routers mediante el uso de Ping y Traceroute.

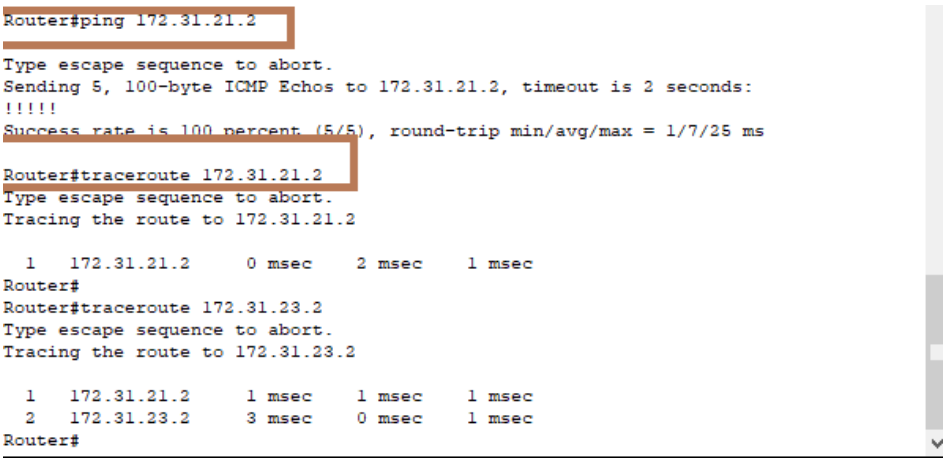
ROUTER (R1)

Figura: 5 ping del R1(Bogotá) a R2



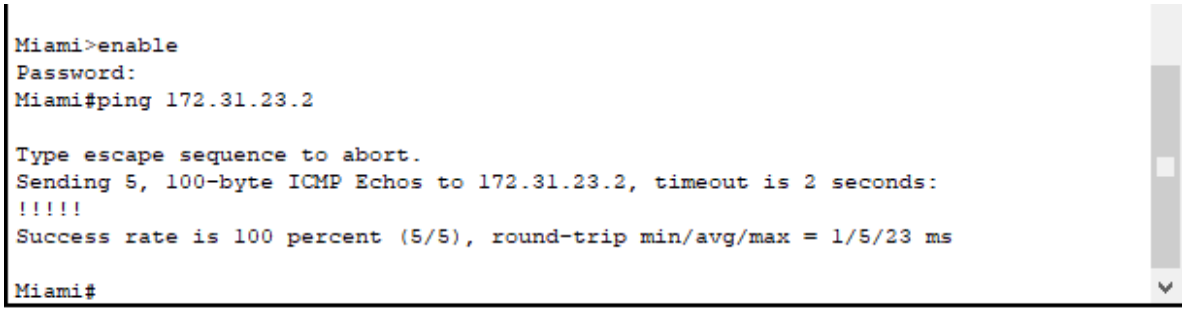
TRACEROUTE (R1)

Figura 6: ping del R1(Bogotá) a R3



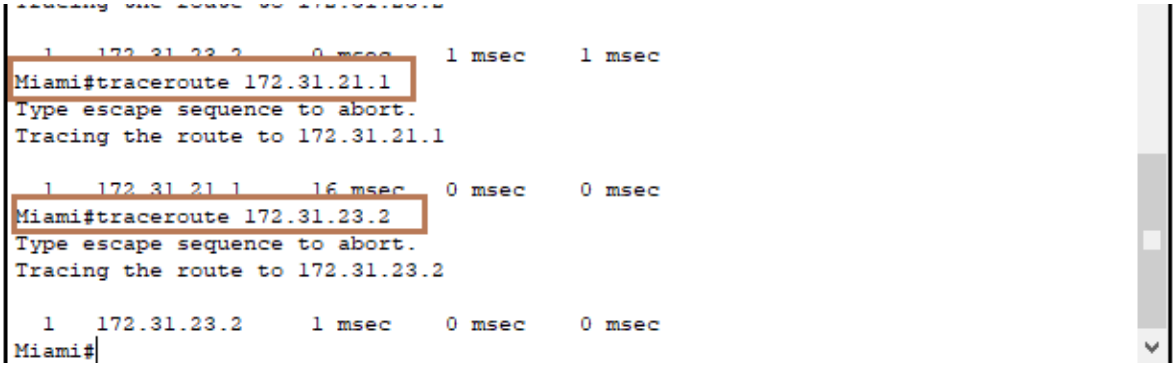
MIAMI (R2)

Figura 7: ping R2(Miami) a R1



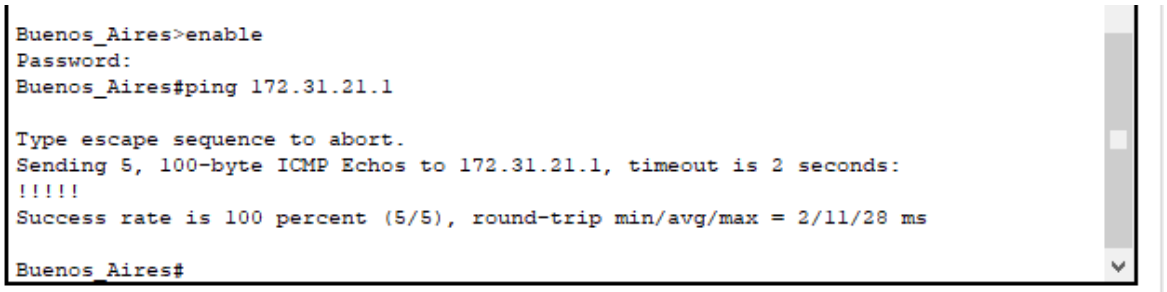
TRACEROUTE (R2)

Figura 8: ping R2(Miami) a R3



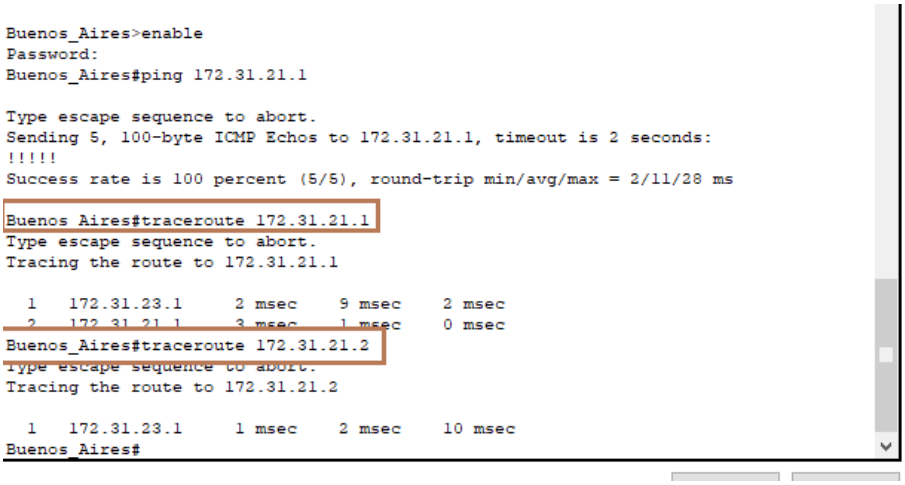
BUENOS_AIRES (R3)

Figura 8: ping R3(Buenos_Aires) a R1



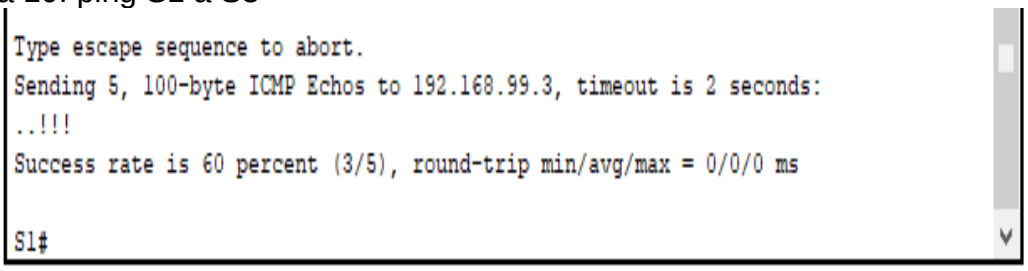
TRACEROUTE (R3)

Figura 9: ping R3(Buenos_Aires) a R2



SWITCH (S1) PIN A S3

Figura 10: ping S1 a S3



MIAMI (R2) PIN A SERVIDOR WEB

Figura 11: ping R2 (Miami) a Servidor web

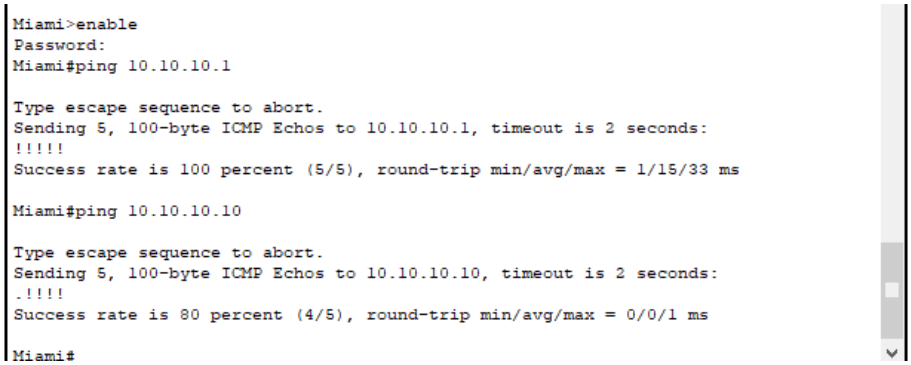


Figura 12: ping PC-B a R2

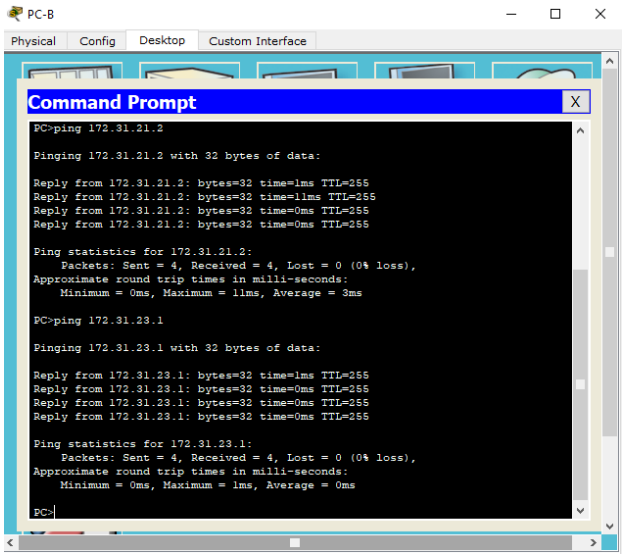
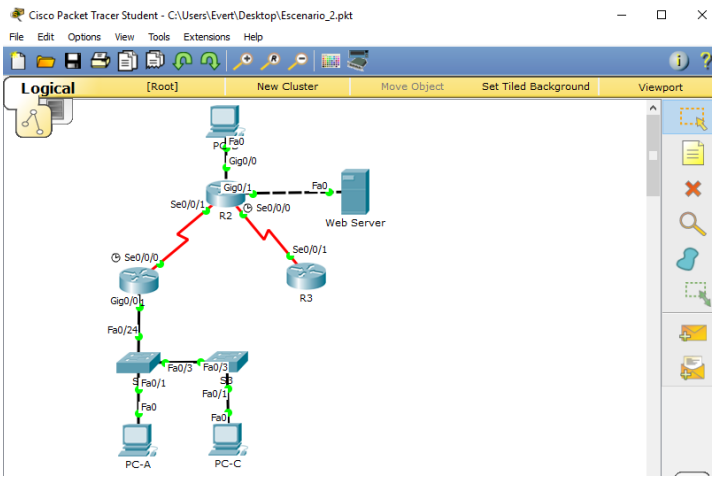


Figura 13: Topología de la red.



CONCLUSION

Este diplomado para mí fue muy importante, para mi crecimiento personal y profesional, no fue fácil, por momentos me daban ganas de dejar todo tirado y salir corriendo, pero al llegar hasta el final le doy gracias a Dios por su acompañamiento y la fortaleza de las personas que estuvieron cerca. También he podido conocer y comprender como realizar una configuración de computadores en una red LAN usando el emulador “CISCO PACKET TRACER”, siendo un tipo de red que se limita a un área relativamente pequeña tal como un cuarto, un edificio, una nave, o un avión; mediante dicho emulador pude simular una conexión de computadores con su respectiva configuración, la cual después de haber conocido el programa a fondo pude desarrollar hasta comprobaciones y verificaciones las cuales me permiten saber el estado correcto de la conexión.

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ANEXOS